Matière
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Emergence of infectious diseases

Risks and issues for societies

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4. Collective action in response to emerging zoonotic diseases

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In recent decades infectious diseases have been the focus of increased attention from medical and veterinary services and many institutions (public and private; governmental and nongovernmental; national, international and transnational, etc.). The main aim is to boost stakeholder involvement in the surveillance and control of these diseases (doctors, veterinarians, patients, livestock farmers, wildlife managers, legislators, researchers, etc.).

Many stumbling blocks are nevertheless in the way that hamper coordinated mobilization of all of these stakeholders, as recently shown following outbreaks of new infectious diseases (e.g., SARS, influenza associated with H5N1 and H1N1 virus strains, Ebola, etc.).

These difficulties are generally explained from two viewpoints – individualist and culturalist – that prevail in medical and veterinary sciences. The individualist viewpoint is based on key elements associated with cognitive and psychological factors or with an individual economic rationale, whereas the culturalist viewpoint stresses the more or less conscious attachment of societies to a legacy of beliefs and know-how that restrain their potential to adapt and respond to new challenges. These viewpoints attribute the failure of infectious disease control systems to differences between actual and expected individual behaviours. They are in favour of the implementation of communication, awareness and educational initiatives as a way to change the knowledge, attitudes and beliefs underlying these behavioural biases.

These viewpoints have been liable to substantial criticism in the human health field (Dozon and Fassin, 2001; Farmer, 2006): they tend to deem that the victims, i.e., patients, are responsible for the spread of these diseases and for the failure of disease control; they show little regard for the rationales of concerned stakeholders, their heterogeneous interests or the collective determinants of individual behaviours. These determinants are broad ranging. Some concern the structural organization of society, which generates inequality with regard to exposure and access to healthcare, thus limiting the ability of some individuals to apply recommendations.[16] Others are linked to the fact that individual

16. Farmer (2006) explains why the poorest women in Haiti sometimes abandon their AIDS treatment. Their reasons are often associated with logistical and economic difficulties regarding access to healthcare and discouragement due to the sluggishness or incompetence of institutions responsible for the poorest people.

behaviours are also the result of their interactions with others, i.e., individuals are influenced by their respective behaviours.

This last point raises the question of the coordination conditions between individuals that enable them to act collectively. The functioning of organizations (e.g., health agencies) and networks (e.g., epidemiological surveillance) relies on this coordination. How can individual behaviours be tailored to build efficient collective action? This issue goes beyond individuals to include coordination between collectives, such as health, governmental and international organization agencies.

This chapter assesses available answers to these questions based on a non-exhaustive review of sociological and economic investigations and empirical studies. The examples given are from infectious disease control initiatives, especially emerging infectious animal and zoonotic diseases.[17] Many are focused on avian flu caused by the H5N1 virus and were identified in research conducted by the author in the framework of multidisciplinary collaborations (social science and epidemiology), in various institutional (academic research and expertise) and geographical settings.

Surveillance and vaccination (when a vaccine is available) are major infectious disease control tools. The examples presented here hinge on these two types of collective action – livestock farmer participation in disease surveillance (with reporting of notifiable diseases to the competent authorities) and involvement in a vaccination programme.

In this chapter, emerging diseases are considered as modern collective risks that are dealt with via collective action. Factors that hamper this action at different individual, collective, governmental and international organization scales are reviewed.[18] The chapter concludes with a discussion on proposals by various international organizations to consider emerging infectious disease (EID) management as a global public good.

Emerging zoonotic diseases – modern collective risks and collective action

EIDs are in many ways new diseases. The underlying biological mechanisms may be new, such as their rate of spread and geographical range (due to globalization and the speed of trade). The processes involved – biological, sociological, political and economic – are increasingly complex. Urgency and uncertainty characterize their management to an increasing extent, given the anticipation imperatives especially of international organizations (e.g., WHO and OIE).

17. Note that 60% of EIDs are zoonotic, i.e., they infect both humans and animals, and that 70% of them are of wildlife origin (Jones *et al.*, 2008).

18. But without any claim to exhaustive coverage of this issue, which would require focusing on many other stakeholders, especially from public and private sectors.

Emerging diseases could hence be analysed based on the 'modern collective risk' concept, with the challenges they pose assessed according to the 'collective action' concept.

Emerging zoonotic diseases – modern collective risks

Infectious human and animal diseases are communicable and may, especially via animals, potentially affect large communities. They are called pandemic diseases in cases of worldwide infection. Communities located in infected regions are involuntarily exposed (environmental contamination, animal or food trade, etc.) thus necessitating collective organization to control the spread of the disease, (i.e., through epidemiological surveillance, vector control, quarantine, sanitary slaughter, etc.).

Infectious diseases can thus be addressed on the basis of the collective risk concept, as defined by Gilbert (1998) and Borraz *et al.* (2007). Godard *et al.* (2002) specified that collective risks are dangers (for confirmed risks) or threats (for potential risks). They directly or indirectly affect individuals as well as communities. They are partially the result of collective behaviours or decisions, while exposure to these risks is beyond individual control. Individual protection initiatives are possible but their efficiency depends mainly on initiatives of other individuals. Management of these risks is in the general or collective interest and thus requires coordinated action, sometimes under the responsibility of the state, and may therefore be analysed through the collective action concept (Borraz *et al.*, 2007).

Collective actions are organized to coordinate the individual actions of members of a collective. The terms of this organization, the intentionality of the action and the formalism of the collective may vary according to the definitions and schools of thought that underpin them.[19] The collective at issue in the collective action concept pools individuals who are more or less deliberately brought together by the same motives. The collective may also include political/administrative authorities, as was our choice here.

Mobilization of large collectives to cope with uncertain issues

Infectious diseases are collective risks that constitute specific challenges. By definition, EID management requires the mobilization of a large heterogeneous collective, especially because of their frequently zoonotic nature. Advanced scientific research has highlighted the complexity of these so-called systemic risks (Mayer, 2000; OECD, 2003), indicating that their emergence is less the result of random events than of complex interactions between humans, animals and their environment [according to

19. This concept is sometimes used in a restricted sense in sociology in reference to a group's political mobilization, with the aim of advancing its interests or voicing its opinions in the public arena. Some see it as being the result of spontaneous dynamics, the logical consequence of the objective structure of problems to solve or the result of an ongoing process, while others consider that it can only be obtained under pressure.

the One Health concept[20]; Jerolmack (2013)]. Their impacts are magnified or revealed by acute social vulnerability (poor health and veterinary services, social inequality) (Farmer, 2006). They are thus able to mobilize large collectives with diverse knowledge and demands (economic, environmental, social, etc.), and whose profile may change, especially with the advancement of knowledge.[21]

Collectives mobilized by EID management have a broad geographical scope. EIDs emerge in a globalized setting where interactions between stakeholders are frequent, rapid and span vast areas, sometimes even worldwide. Accordingly, they represent large-scale health risks that spread quickly and require rapid transdisciplinary, trans-sectoral and even transnational coordination (Gilbert, 2007; Beck, 2006). This geographical setting may also be constantly shifting (Hinchliffe *et al.*, 2013; Enticott, 2008). The advent of EIDs has renewed collective action issues because of the variety of members involved and the size of the collective potentially mobilized.

EIDs also pose new challenges to collective action because of the highly uncertain setting in which this action takes place. Emerging (or re-emerging) diseases are new or arise in a new or changed setting. Typically there is a high degree of uncertainty surrounding these diseases and limited knowledge on them.

The uncertainty that characterizes many emerging diseases cannot be used to justify inaction in the contemporary socio-political context. Sound scientific knowledge is generally required to clearly guide individual, collective and public decision making. However, while considering the current rise of the precautionary principle and the critical need for anticipation, the management of these diseases calls for early action despite the lack of reliable data or even in the controversial scientific setting that may prevail (Godard *et al.*, 2002).[22]

This action takes place in settings where the 'visibility' of the issue is variable. The challenge is sometimes to be able to act in response to weak signals that may herald a potential disaster [e.g., in the case of H5N1; Chateauraynaud (2011)], whereas a response to massive infections may sometimes be required (e.g., in the case of Ebola outbreaks). Collective mobilization is thus sometimes complex and must take denial and even panic

20. The One Health concept is an attempt to broaden the horizons of sectoral approaches to health issues. During a symposium organized by the NGO Wildlife Conservation Society in September 2004 on 'current and potential movements of diseases among human, domestic animal and wildlife populations', the participants, including many international organizations (WHO, FAO, OIE, IUCN, etc.), drew up the '12 Manhattan Principles', which underpin the One World, One Health concept, which in turn is the basis of the One Health concept. They underline that human, animal and ecosystem health are one and the same, thus warranting an intersectoral approach and multidisciplinary research.

21. In the UK, for instance, badgers were blamed for spreading bovine tuberculosis. Health authorities decided to slaughter these animals in 2013 in order to reduce contamination of cattle herds. Environmental conservationists, who previously had nothing to do with the tuberculosis issue, became mobilized and thus enhanced the collective formed to manage this disease.

22. Here we refer to the precautionary principle as defined by (Godard *et al.*, 2002). Precaution differs from prevention, i.e., prevention applies to confirmed risks, while precaution concerns potential risks and uncertainties. Precaution should not be equated with an inaction principle prompted by excessive caution.

reactions into account (but not necessarily related to the signal intensity). Diseases can also be manipulated by actors taking advantage of the scientific uncertainty situation for reasons of economic or political expediency.

Control of EIDs (animal, human or zoonotic), as compared to more conventional risks, thus boosts the challenges facing collective action – as it involves coordinated mobilization of increasingly numerous and heterogeneous stakeholders and groups of stakeholders who are called upon to act quickly despite a limited knowledge base. Hereafter we will examine the terms of and barriers to this coordination between individuals, and then between collectives.

Motives and barriers to collaboration between individuals

Individuals represent the first scale for collective action analysis. Informed rational individuals sharing a common interest are usually expected to become organized in mutual defence of this interest. But several barriers have been identified. Individuals may not be aware of the common interest. There may also be no common interest in the absence of 'win-win' situations. Moreover, even if there is a common interest, individuals conciliate all of these interests according to the range of different associated constraints or favoured values. Finally, the sum of rational individual behaviours can produce aberrant results from a collective standpoint. These three aspects will be successively examined here.

From individual interests to the common interest

Individualist and culturalist approaches generally consider that individuals may not perceive their common interest due to a number of barriers associated with cognitive[23] (linked with information gaps), psychological[24] (linked especially with emotional factors) or cultural[25] (linked with traditional elements that hamper individual behavioural changes)[26] biases, which in turn contribute to the lack of awareness of the common interest. These factors are particularly important when dealing with a novel situation never before

23. From a cognitive science standpoint, several phases are involved in behavioural changes to adapt to a new situation. These phases differ according to the theoretical models (knowledge-attitude-behaviour, planned behaviour theory, health belief model, etc.). Information and education always have key roles in these models, by successively orienting individuals' attitude and behaviour.

24. Psychologists have shown that acceptance of a new traumatizing situation involves five stages of grief: denial/panic and anger/bargaining/depression/acceptance (Kübler-Ross model).

25. The existence of more or less conscious and explicit beliefs, routines or behavioural heuristics may hamper an individual's adhesion to the belief that action is possible. This could lead to rejection of explanatory models related, for instance, to modern medicine (veterinary). So-called premodern or traditional societies are sometimes characterized by a fatalistic attitude.

26. Behavioural economics also identify many other psychological aspects, such as risk aversion, perceived probability distortion, etc.

encountered by the individuals, as in the case of the onset of emerging or re-emerging diseases.

These cognitive, psychological and cultural factors are often put forward to distinguish emotional, traditional and subjective approaches of ordinary individuals from rational, modern and objective approaches of experts. From a less binary and normative perspective, it should also be considered that everyone in a society of individuals (experts and ordinary individuals) is subject (but not necessarily in the same way, with the same intensity or simultaneously) to these cognitive, psychological or cultural factors.

It should also be mentioned that discussing barriers to taking a common interest into account requires taking a top view stance to state a truth, i.e., the existence of a common interest, which otherwise would be overlooked by the social stakeholders. Yet the very existence of a common interest should also be questioned. The definition of the common interest is not immune to the power relationships and impacts of authority that structure societies. All stakeholders do not have the same power to define the common interest.

In France, animal disease management terms were recently redefined under the new governance for animal health (*Nouvelle gouvernance sanitaire,* NGS) concept (resulting from discussions during a national consultation on health issues, in 2010 and formalized in an Agricultural Orientation Law).[27] This new health governance concept outlines the respective roles of the state and livestock farmers so as to increase the accountability of farmers and professional organizations. Endemic low or noncommunicable animal diseases (so-called category 3 diseases) are managed via individual initiatives. Endemic diseases communicable between livestock farms (category 2 diseases) are managed through a voluntary collective programme (state approved). However, direct state authority intervention is required in the event of highly communicable epidemic diseases, and when the associated health risk could "seriously harm public health or the production capacity of an animal sector" (category 1 diseases).

This disease categorization is not solely based on the objective structure of the problems at hand. The abovementioned French Agricultural Orientation Law admittedly categorizes these diseases according to intrinsic features (endemic or epidemic, more or less communicable). It also incorporates the biological and economic impacts according to whether they are of private (category 3) or collective (category 2 or general category 1) interest (Rat-Asper and Krebs, 2013). In actual practice, however, these categories and the roles they assign are also the result of negotiations. As for other types of risk, animal diseases sometimes prompt social mobilization to demand recognition and management of the problem by public authorities. For animal diseases, an example concerns the demand of French livestock producers (involved in export sectors) for stricter regulations on infectious bovine rhinotracheitis (IBR), which is currently ranked as a category 2 disease but could, as a result of this pressure, be reclassified as a category 1 disease. Examples regarding

27. Decree 2011-862 of 22 July 2011.

human diseases include the mobilization of associations of AIDS or Lyme disease victims. It is hence both the mobilized collective that defines the problem and the 'nature' of the interest and the problem that determines the collective to be mobilized (Mormont, 2009).

Let us now look at the situation regarding an animal disease managed by livestock producers' collectives.[28] It may be of interest for all livestock farmers to vaccinate their animals against this disease, especially since the individual vaccination cost is offset by productivity gains. These farmers could also benefit by forming collective groups to facilitate vaccine supply and a vaccination scheme. Several livestock farmers' collectives have thus been organized as animal health protection groups (GDS) in France.

However, the cost-benefit ratio of a vaccination scheme varies among farms because the extent of loss associated with a given disease is dependent on the livestock production system (Chilonda and Van Huylenbroeck, 2001). The vaccination benefits are therefore not the same for everyone because members of a group do not necessarily have the same cost-benefit structure. For instance, in Corsica, farmers running extensive livestock farms offset productivity losses associated with the presence of Aujeszky's disease[29] by rearing a greater number of pigs (thus upholding the farmer's labour productivity), whereas more vaccinations are performed on intensive livestock farms where the aim is to maximize the production of each animal.

Another example concerns foot and mouth disease control in southern Africa. Control of this disease is a public policy priority in several countries in this region. This control mainly benefits livestock producers who export to the most profitable international markets, since this condition must be fulfilled to gain access to these markets. The disease actually only affects livestock to a limited extent, especially on extensive livestock farms. However, the indirect costs of this control burden all of the livestock farmers even if they do not export their products: limited animal movement (which can be highly restrictive during drought periods and for marketing), or quarantine and sanitary slaughter (Figuié and Fouilleux, 2013; G.R. Thomson, 1995; Scoones and Wolmer, 2007).

Recommended measures, rather than the actual goals, are also often debated amongst those responsible for their implementation. Livestock farmers can strive to control an animal disease but differ on the choice of measures taken by the veterinary authorities, especially when these authorities recommend preventive culling. The same holds for animal protection associations, and society in general, shocked by the image of animal slaughters carried out during the last foot and mouth epidemics in the UK. Although the importance of controlling animal diseases is recognized throughout communities, the priorities may differ between individuals, their immediate economic interests (especially their cost-benefit structure, as discussed above), but also according to the norms and values that guide their actions.

28. This is the case in France regarding endemic low or noncommunicable animal diseases (category 3).

29. Aujeszky's disease (also called pseudorabies) is a non-zoonotic viral disease that mainly affects swine.

A case of altruism? Rationales and values

Adherence to common values or social norms promotes the pooling of individual behaviours into collective actions.

Neoclassical economics calculations pit personal interest against altruism or solidarity and selfish individuals against altruistic individuals.[30] Sociologists, on the other hand, compare different types of rationale (rather than individuals), while highlighting the variety of rationales and logics that guide the behaviours of single individuals.[31] In Vietnam and Thailand, in several villages where poultry rearing was the main activity, farmers reportedly exchanged information on the health status of their animals (Paul *et al.*, 2015; Figuié and Desvaux, 2015). This constituted an informal farmer-formed epidemiological surveillance network that was relatively independent of the systems set up by the veterinary health authorities. The information exchanged informed everyone on the poultry diseases present, thus enabling them to take preventive (increased surveillance of their own birds, restricted entry on the farm, cleaning of the premises, etc.) or mitigation (advanced sale of animals) measures.

Farmers are altruistic when they inform their neighbours about the outbreak of an infectious disease causing high mortality, such as avian flu. What drives these farmers is also the hope of being paid back, i.e., to be informed when there is a disease outbreak on a neighbour's farm.[32] Moreover, if the farmers in the case mentioned above adopt altruistic behaviour with regard to other members in their community, then this behaviour is selfish with regard to non-community members. Social (family, professional network) and geographical (within a few kilometres) proximity facilitates information flow within a small network (Figuié and Desvaux, 2015). Disease outbreaks are, however, not revealed to potential buyers outside the collective – it is essential to quickly sell animals exposed to the disease to curb economic loss. This comes with the risk of contaminating the livestock of external buyers or jeopardizing consumer health. Moreover, this information is not transmitted to veterinary authorities – livestock farmers expect little support from these authorities and strive to avoid potential coercive measures (sanitary slaughter, set up of a quarantine area, etc.).

30. So-called 'rational selfish' individuals give preference to their own interests over those of the group, hence to the detriment of the construction of collective goods, whereas more cooperative individuals with altruistic and solidarity values focus on the group interest, with their own personal interests taking a back seat.

31. The sociologist M. Weber drew up a typology of forms of rationality and distinguished between instrumental rationality (oriented towards the result of actions) and value/belief rationality (favouring behaviours in line with values, independently of the result of this behaviour). In the first case (instrumental rationality), the individual alone makes decisions on an isolated risk, while only considering the consequences of his/her decision. In the second case (value/belief rationality), the individual favours a behaviour that is in line with the values of his/her group, regardless of the consequences.

32. The distinction between value/belief and instrumental rationality is not entirely satisfactory. Value/belief rationale actions could serve individual interests in the long term. A calculation and the expectation of receiving a return payment could justify solidarity.

Similar examples have been reported by Paul *et al.* (2015), who studied avian flu management by Thai fighting cock breeders, and by Prete (2008), in a study on tomato disease surveillance in France.

The often over reductionist and decontextualized *Homo economicus* viewpoint overlooks the broad range of rationales and complex behaviours driven by multidimensional logic. The conflict does not solely concern the opposition between personal interest and collective values, but also between the many different rationales and values that pilot the behaviour of a given stakeholder in relation to his/her multifaceted social allegiance. This could explain the resistance of young South African veterinarians during an avian flu outbreak in 2004 who were torn between their veterinary public health mission, animal protection mission, the nature of their relationships with their customers and their overall relationship with animals. Several of these veterinarians thus refused to carry out preemptive slaughter of ostriches due to avian flu outbreaks because, in addition to being reared for production, these birds are also pets (35-year lifespan in captivity). The veterinarians did not overlook the fact that these birds have emotional value for farmers.

Animal health free riders

Many obstacles have to be overcome before all individuals are ready to adopt a behaviour conducive to the collective interest, even when there actually is awareness of the common interest. Economics game theory applications can highlight these obstacles. But the aim here is limited to illustrating the complicated convergence of individual behaviours, not to discussing all of the explanatory frameworks put forward by this theory.

It is generally of interest for farmers to eradicate, from their area, any disease affecting their livestock. Animal disease eradication can both reduce animal losses (mortality or reduced productivity) and avoid the cost of vaccination which is no longer useful. When a vaccine is available, however, eradication can usually only be achieved if all farmers agree to vaccinate their livestock against the target disease over a period of several years.

Farmers who vaccinate their animals help reduce the prevalence of the disease while reducing the exposure of neighbouring livestock to the causal agent, thus generating a positive externality (Rat-Aspert *et al.*, 2008), i.e., herd immunity. Optimal vaccination coverage is around 70%–80%, which is sufficient to halt (but not eradicate) disease transmission, while reducing the risk of contamination of unvaccinated animals. Some farmers may be tempted to benefit from this herd immunity without vaccinating their own livestock, thus avoiding the vaccination cost and exposure to possible side effects – in this way they benefit from the commitment of other farmers to the vaccination scheme.

Economists call this ‘free riding’ behaviour, claiming that it is one shortcoming of collective action. This shortcoming arises because collective action generates a positive externality, i.e., a good for which those who have not contributed may benefit (in economics, this is referred to as getting a ‘free ticket’).

Farmers who do not vaccinate their livestock benefit from this vaccination coverage as long as a sufficient number of farmers do vaccinate their livestock. Paradoxically, the extent of free riding can increase with the success of the collective action, with everyone taking the success of the results of this action for granted, thus jeopardizing the follow-up (Siegal, 2009). Moreover, cooperative farmers may be discouraged by this free riding behaviour and may, in turn, stop cooperating.

Some authors, such as Olson (1978), thus consider that collective action is improbable in the absence of external pressure. Rat-Aspert *et al.* (2008), in a theoretical modelling study on bovine viral diarrhoea (BVD), also showed that vaccination coverage leading to disease eradication can only be achieved when vaccination is completely free and compulsory.

Problems may even also arise with regard to epidemiological surveillance. Surveillance in informal surveillance networks, as described above, helps generate health information that is available for the entire collective. The cost can be high for farmers who report a disease outbreak in their livestock if the information leaks out of the network and comes to the attention of health authorities (animal marketing restrictions, stigmatization, even total slaughter, etc.). Farmers therefore have to trust the farmers' community and will only benefit later from their behaviour on condition that all of the other farmers adopt the same behaviour. Given these unknowns, it is tempting for some to take advantage of information supplied by other farmers while not contributing personally.

Confidence (in being repaid the cost of being collaborative) is a prime factor of collective action. Different economics games based on social dilemma have shown, amongst other factors, that individuals tend to increase their cooperative behaviours as the game time increases (and is known by the players) (Isaac *et al.*, 1994, cited by Ostrom (2000).[33]

Here it should be stressed that one feature of emerging diseases is that they are new for stakeholders affected by them. Moreover, these diseases are often managed in an emergency setting without the application of sound intervention rules. Hence, there are substantial information asymmetries, with uncertain reciprocal behaviour expectations. These different elements further add to the collective action challenge regarding EID management.

Challenges facing the expansion of collectives

THE BARRIERS DISCUSSED ABOVE MAINLY concern horizontal coordination between individuals, i.e., without any hierarchical relationship. Many also concern collaboration

33. Ostrom (2000) suggested that cooperative behaviours are the result of a dynamic process and underlie certain social norms. Cooperation is thus quite 'natural' [Ostrom thus counters the opinions presented in Olson (1978), and Crozier and Friedberg (1977)]. Collective action is widespread according to Ostrom, despite the identified barriers. It gives societies an evolutionary advantage and is more effective when the rules of this action are defined by the collective rather than by an external authority.

between collectives, as we address in this section. Our analysis thus involves a change of scale from between-individual to between-collective collaboration.[34]

Regarding emerging zoonotic diseases (i.e., most EIDs), collaborations are expected to increase due to the systemic nature of these diseases, thus calling for intersectoral action (human and animal health, ecology, etc.). Moreover, an increasingly broader spectrum of collectives are involved worldwide as these diseases are associated with globalization. Collective action studies have, however, revealed that small-scale collectives are conducive to collaborative behaviours – confidence is based on interpersonal knowledge and individuals can more readily anticipate each other's behaviour.

Increasing the size of collectives involved in emerging zoonotic disease control therefore presents a genuine challenge. This expansion brings social stakeholders from various backgrounds into contact (e.g., see the example below of human health and veterinary health institutions). Social stakeholders may be confronted with possibly diverging reactions (e.g., stakeholders of a market chain). It may also establish contacts between stakeholders with contrasting political strategies and practices regarding health crises (governments, NGOs, etc.). Here we look at these three aspects.

Organizational and cultural silos hampering intersectoral cooperation

As for individuals, the more or less conscious attachment of a collective (health agency, ministry, international organization, etc.) to a legacy of beliefs and know-how can hamper its adaptation and response capacity when a new problem arises.

The thrust of the One Health concept developed by international organizations is that emerging diseases are not restrained by interjurisdictional boundaries and that human, animal and environmental health must be considered as a joint unit.

However, both knowledge production and public intervention are relatively tightly organized by scientific disciplines and lines of activity. This organizational division of labour hampers the assessment of complex, hybrid and systemic problems such as EIDs. Jerolmack (2013) refers to organizational silos when discussing barriers to collaboration associated with organizational cultures. These cultures have the advantage of facilitating the adaptation of organizations to the specific problems they have to deal with (human health, animal health, agriculture and environment). However, they are also limited by the reduced capacity for renewal of cognitive and analysis frames needed to cope with new and more complex problems. These silos thus diminish opportunities for interagency cooperation.

Jerolmack (2013) illustrates this silo phenomenon via avian flu control in the United States. Several mechanisms hamper collaboration between US agriculture and wildlife

34. This also broadens the horizontal coordination challenge by incorporating that of vertical coordination, i.e., between hierarchically organized collectives.

agencies. First, the specific missions of these agencies differ, i.e., protecting farmers for the former and protecting wildlife for the latter. Secondly, paying attention to the agency's reputation overrides the disease control goal, i.e., the former seek above all to avoid livestock (poultry) slaughter, while the latter are focused on avoiding wildlife slaughter (as wild birds are vectors in the spread of avian flu). They therefore mutually reject the blame for any new outbreaks.

Alignment and misalignment of interpretive frames

The organizational silo concept refers to a certain degree of immobility linked to cultural heritage. But collectives can also be more reactive. This raises the problem of the diversity of reactions, which could be linked to the interpretive frames of the social stakeholders involved.

In sociology, frames serve as interpretive schemes for perceiving, interpreting and assessing events and situations. Moreover, frames adopted by individuals guide their reactions to these events and situations (Goffman, 1991; Cefaï and Trom, 2001). Collective action is possible if collective stakeholders share a common frame or at least compatible frames (referred to as 'frame alignment'; Snow *et al.*, 1986). This phenomenon is clearly illustrated in the following example.

As mentioned above, EID management requires mobilization of a broad and heterogeneous collective. Studies on avian flu management in Vietnam amongst consumers, farmers, sector stakeholders, policymakers and the international community highlighted the variety of frameworks through which different stakeholder groups grasped and defined the avian flu problem.

International organizations (FAO, OIE, WHO) perceived the emergence of the H5N1 virus as an unprecedented major risk. These agencies called for widespread mobilization to control this virus, especially via poultry flock surveillance (as it is a zoonotic risk). Different studies conducted in Vietnam showed that this framing of the H5N1 virus and the associated disease (avian flu[35]) was far from being shared by everyone, or was for only short periods.

The Vietnamese village farmers studied by Figuié and Desvaux (2015) and at the forefront in combating this virus (which emerged in the region in 2003) suffered massive poultry mortality on their farms. They also feared for their own health in the presence of this disease, which they initially compared to severe acute respiratory syndrome (SARS, which had spread from China to Vietnam in 2003).[36] This prompted them to collaborate with a national online surveillance system set up by the Vietnamese authorities, in line with the recommendations of international organizations (Figuié, 2013). In particular, they notified veterinary authorities when outbreaks occurred on their farms (they readily

35. Other viruses may also cause avian flu.

36. SARS emerged in China in 2003 and spread to 29 other countries within a few months, causing over 900 deaths worldwide.

reported these events in the hope of obtaining support from the authorities to help them deal with this new disease). There was hence alignment at first, with agreement between the different analytical frameworks (national authorities, farmers) on considering avian flu as a pandemic risk, which paved the way for potential collaboration.

With time, however, especially marked misalignment occurred in villages that had experienced several avian flu outbreaks. Farmers in these villages became familiar with the disease and stopped fearing for their health. The number of human cases was actually quite small.[37] The pandemic threat diminished as farmers realized that the comparison with SARS was less relevant – they then changed their viewpoint on avian flu, considering it simply as an epizootic disease which they compared to Newcastle disease (rather than SARS) which regularly decimated their poultry flocks (without harming humans). Hence, they stopped reporting outbreaks to the authorities (in this way avoiding the negative impacts discussed above), thus disconnecting their informal surveillance system from the official one.

This same alignment/misalignment phenomenon was observed in consumers surveyed in Hanoi by Figuié and Fournier (2008). At the start of the avian flu outbreak, consumers massively stopped eating poultry. This contributed (by halting the demand) to enforcement of the government ban on poultry marketing (a ban that was subsequently limited to the marketing of live poultry). However, they quickly ruled out the food-risk aspect since no cases of such transmission had ever been officially confirmed. Then the zoonotic risk (associated with contact with live poultry) was excluded. Poultry purchases and consumption, including live poultry purchases, therefore gradually resumed in Hanoi, regardless of the ongoing bans.

The pandemic or zoonotic potential of the virus which triggered the international efforts is currently not taken into account in the local framing of the disease and associated health risk. This explains farmers' and consumers' low adherence to the recommendations issued by the authorities (case reporting, halting live poultry trade in urban areas).

Crises used for political ends – state of emergency versus technical democracy

The two previous points highlighted cultural stagnation or haphazard reaction situations. However, there are other more strategic reactions from stakeholders making use of the new problem to make background changes (organizational, economic, political, etc.) that emerge, whereas other stakeholder groups may oppose these changes, thus impeding collective action.

37. No human cases were reported in the villages studied by Figuié and Desvaux (2015). There have been few cases in Vietnam and elsewhere in the world in comparison to the number of deaths associated with other diseases: 64 people have died from H5N1 avian flu in Vietnam since 2003 (454 people worldwide) according to WHO (on 25 January 2018).

Because of their global nature, EID management requires the expansion of collectives responsible for this management, as well as their reconfiguration to promote collaboration. Broader collaboration can be achieved by obligation or enticement.

Emergency measures can be instituted and a state of emergency declared in order to achieve overall behavioural alignment. This 'conventional' management strategy, via quarantine and isolation, was used in the past to manage major epidemics like the plague. This strategy is still widely used for animal disease outbreaks, sometimes accompanied by mitigation measures (especially compensation for farmers). In the late 1990s and early 2000s, management of mad cow and foot and mouth disease in the UK relied on massive compulsory slaughter, which greatly shocked the public. Meanwhile, there has been a return to some of these coercive measures to manage outbreaks of contemporary emerging diseases affecting humans.[38] Management of the Ebola outbreak led to travel bans (disease buffer zones), meeting bans (including a ban on Christmas festivities in Sierra Leone in 2014), curfews and home confinement measures forced on inhabitants over several-day periods (e.g., over six million Sierra Leoneans were obliged to remain at home from 19 to 21 September 2014).

The systems may voluntarily encompass more than just disease control. Fintz (2010) studied avian flu (H5N1) management in Egypt in 2005–2006 and showed how the accompanying rhetoric was conducive to the development of strong dynamics, leading to the imposition of emergency measures serving an authoritarian political regime (and used to electoral ends), and an agricultural modernization vision. These systems have also been exploited in community conflicts, e.g., massive violent slaughter of pigs belonging to Coptic communities.

Other less authoritarian and more democratic avenues could help meet the collective action challenge. Democracy (based on transparency, accountability and inclusion principles) is thus presented as a response to prevailing uncertainty, not to emergencies.

Modern risk management involves the participation of a broad network of stakeholders involved in various scientific, administrative and political domains. This idea is advocated by the science, technology and society (STS) movement, which calls for 'technical democracy' (Callon *et al.*, 2001) based on a mutual understanding of collectives (i.e., recognition that they are made up of already organized stakeholders that can legitimately define common action regulations).

Use of the governance concept in research on modern risks reflects a similar idea (Van Asselt and Renn, 2011). According to this concept, which emerged in the early 21st century, modern risk management requires the integration of different fields of knowledge (multidisciplinary, expert and layman knowledge), in addition to the incorporation of social

38. For instance, this excerpt from an article in *Le Monde* (18 May 2003): "On Thursday 15 May, China published an interpretation of the Communicable Diseases Act, stating that anyone opposing a quarantine measure and disseminating severe acute respiratory syndrome (SARS) is liable to the death penalty or life imprisonment." During the Ebola outbreak in 2014, an Ivorian was sentenced to five years' imprisonment for consuming rat meat (*Koaci*, 28 August 2014).

values and concerns in the decision-making process. Moreover, for similar reasons, Beck (2009) points out how modern risks can be conducive to a democratic turn.

Some researchers are nevertheless more critical of the potential impacts of a new risk governance approach. Borraz (2008) underlined that this broader range of stakeholders does not necessarily bode for more democracy, but it is an acknowledgement that the definition and management of modern risks are no longer monopolized by scientists and technocrats. In this encouragement for participation, other researchers who flaunt Foucault's approaches in terms of governmentality see a new form of power based on increased surveillance (O'Malley, 2008) and policies based on 'good citizens' who have internalized the idea of moral responsibility (Ewald, 1996).

In all events, the management of emerging diseases, large-scale risks, and sometimes associated crisis situations has political transformation potential that may involve many stakeholders.

Emerging diseases therefore pose the challenge of building broader collectives to cope with complex associated large-scale risks. But here is also an opportunity for setting up new forms of government.

A new paradigm for animal health?

State recognition of the importance of collaborating on health issues is longstanding but has been further confirmed in the recent disease outbreak context. International (human and animal) health agencies stress that emerging diseases know no geographical boundaries. Due to the intensity and speed of trade – an outbreak can spread from an isolated area in the world to a remote city in less than 36 hours (Otker-Rob, 2014) – there are direct and indirect global impacts (including those related to measures taken to control them) because of economic and social interconnectivity.

International mobilization may be explained by moral duty and responsibility for the protection of a common good rather than pressure. There are, however, several obstacles to collaboration between states on this common good, including those related to different national priorities and interests and the willingness of states to defend their sovereignty.

Animal health – the advent of a new global public good

In the light of recent SARS, flu and Ebola outbreaks, various stakeholders (international organizations, NGOs, etc.) involved in human or animal health management have argued that the management of these diseases should be considered as a global public good.

This latter term is borrowed from economists, who distinguish between public goods and common goods on the basis of two features:
– non-rivalry: consumption of a good by an individual does not prevent its consumption by another individual;

– non-exclusion: no one is excluded from the good, which is available for everyone.

Public goods are non-rivalry and non-exclusive goods, such as air or solar energy and outbreak control. Common goods involve rivalry but are non-exclusive, such as fish stocks, water, etc.[39]

The global public good concept is used in the international relations field (Gabas and Hugon, 2001), while some authors consider that the global health concept is simply a health field variant (Kerouedan, 2013).

However, disease prevention and control systems are actually considered as global public goods more than health itself. Economists refer to intermediate public goods in such cases. Moreover, disease prevention and control are a specific type of global public good, and referred to as the 'weakest-link global public good'. Perrings *et al.* (2002) illustrated this with regard to the control of biological invasions, including pathogens: the level of control implemented by a country has implications on the risk facing other countries; and the level of protection of all countries is hampered by the resources available in the poorest of these countries.

Considering human health as a global public good is not a new idea (Boidin 2014), but it is more so with regard to animal health, and this is virtually driven by emerging diseases.[40] The global public good concept is nevertheless complex. In the EID context, international organizations essentially apply this concept to prevention via epidemiological surveillance. In a document published in 2008 following an avian flu (H5N1) outbreak and outlining a joint strategy for reducing human and animal infectious disease risks, major international organizations (FAO, OIE, WHO, World Bank, etc.) stated:

> "Preventing emergence and cross-border spread of human and animal infectious diseases is considered to be a global public good… Surveillance systems that underpin the prevention of emergence and spread of such diseases are also recognized as a global public good" (FAO *et al.*, 2008).

The document also stated,

> "As it is not clear what a disease's potential is until after it has emerged, surveillance for potentially pandemic EID is clearly a global public good…" (FAO *et al.* 2008).

39. Sociologists generally use the term 'common good'. In sociology, the issue is less about focusing on the intrinsic nature of a good than on the way it is constructed and managed. Reference to a common good suggests that there is a general interest based on shared values or even universal rights (so the meaning differs from that of economists).

40. Regarding animal disease control, Gabas and Hugon (2001) mentioned that, "the control of epizootic diseases in Africa is clearly threatened by states with the least effective policies and within which disease outbreaks are ongoing – hence the efficiency in management of this public good will be markedly altered". They then added, "However, vaccines developed against major diseases, particularly AIDS, fall in the category of 'best shot goods' that are produced by the richest countries and their businesses." So-called 'additive goods' are the result of the sum of the efforts of all stakeholders, such as climate stability (Gabas and Hugon, 2001).

Epidemiological surveillance generates health information, which has a complex status. In 2007, Indonesia decided to no longer share flu virus samples collected within the country with WHO on the grounds that the country did not benefit from this sharing, especially access to vaccines developed from the supplied samples.[41] This decision sparked a debate on the status of virus samples – should they be considered as biological resources and therefore covered by the Convention on Biological Diversity, which affirms that states have sovereignty over their genetic resources? Or otherwise should they be considered as epidemiological information and thus covered by the International Health Regulations, which oblige states to share this information[42] (Fidler 2008)?

Another element of complexity is the merger of human and animal health via the zoonotic disease issue in the global public good concept. Human health is considered a public good since it concerns the universal right to health, but the status of animal health is less clear-cut. Animal health via zoonotic diseases does concern human health, but not solely. Animal health also comes under sectoral objectives of productivity, industry competitiveness and compliance with trade standards. Making animal health a global public good tends to mask the diversity of interests involved. The reference to a common good and an accountability ethic rallies states behind a common international health (and zoosanitary) governance project. The concept is nevertheless complex, applied *de facto* to a range of issues while concealing diverse interests. Many aspects must be adjusted to ensure its practical implementation. Emerging disease prevention and control are thus global public goods, but this categorization has yet to be clearly outlined.

Diversity of national interests in addressing zoonotic disease risks

As previously analysed on an individual level, setting up global health governance raises the question on whether or not there is a common interest.

A modelling study conducted by Colizza *et al.* (2007) highlighted the benefits of an international collaborative infectious disease control strategy, even for countries with the greatest technical and financial healthcare capacities. These authors modelled a pandemic influenza situation resembling that of the H5N1 virus emergence. Only a few countries produce and have access to antiviral agents needed to curb outbreaks, but they are not the main countries affected by outbreaks. The authors developed and compared different antiviral agent sharing scenarios on a worldwide scale. These scenarios differed in terms of the quantity of antiviral agents that producing countries provide to build up a global stock, which in turn is distributed to different countries according to the outbreak spreading pattern. The authors showed that the altruistic cooperative sharing of antiviral

41. Indonesia then signed a bilateral agreement with Baxter, a transnational pharmaceutical company, for the exchange of genetic material (flu virus) and vaccines.

42. An international agreement was subsequently signed (PIP agreement) to clarify the issue of sharing access to infectious agents and vaccines.

agents enhances outbreak control to the benefit of all countries, including donor countries. Moreover, rolling back the outbreak peak gives more time to prepare a suitable vaccine.

This altruistic cooperative sharing behaviour is, however, far from being common practice, as shown during the H1N1 outbreak in 2009, and the much deadlier Ebola virus outbreak in 2014–2015. In the latter situation, the most affluent countries like the United States built up strategic reserves of caregiver protection equipment (suits, masks, overshoes)[43], which momentarily led to shortages in countries with more Ebola patients (over 26,000 patients in West Africa, and four in the United States[44]). This shortage fortunately did not last very long, as otherwise it would have increased the risk of international spread of the disease.

As for the farmers mentioned above, there is also a problem of the costs borne by countries that are transparent in declaring the diseases present or even just suspected within their borders (EIDs provide an opportunity to strengthen early warning initiatives). Export or even air transport restrictions[45] may follow, often with a concomitant disastrous impact on the country's economy, as well as on social and political stability, which could be even worse than the impact of the disease itself (Otker-Rob, 2014). Nuzzo and Gronvall (2011) cited a suspected case of a plague outbreak in India in 1994, which was ultimately unconfirmed but cost the country billions of dollars.

The goal of the global governance initiative set up by international organizations (FAO, OIE, WHO) is indeed to avoid the implementation of unwarranted restrictions. These organizations are nevertheless not immune to criticism of states which, when directly concerned, may find the implementation of international recommendations economically detrimental on a national scale – during a SARS outbreak, Canada thus strongly criticized WHO for advising against unnecessary travel to Toronto, which resulted in heavy financial losses for the country. However, it is hard to assess the cost (health, economic, etc.) that all countries would have had to bear if these trips had not been advised against.

Ambiguities in global health governance

There is quite broad consensus on the need for global health governance, but many conflicts of interest still have to be resolved.

Scoones (2010) showed that Western country priorities dominated the new global health governance initiatives set up during recent emergencies, while overlooking structural inequality in resource access and risk exposure. Moreover, according to Calain (2007), this governance forces poor countries to focus on potential disasters despite not having sufficient resources to cope with 'standard' infectious diseases such as meningitis and malaria.

43. http://www.slate.fr/story/95051/equipement-anti-ebola-penurie#xtor=RSS-2

44. According to a WHO report on the Ebola outbreak situation published on 22 April 2015.

45. See the *Le Monde* article of 11 May 2003, "SRAS : le coût pour les transporteurs aériens est deux fois plus élevé que celui dû à la guerre d'Irak".

Similarly, Kerouedan (2013) studied the global health concept. She showed that the international health concept which preceded the global health concept in international organizations was focused on problems encountered by developing countries, especially on diseases that weigh most heavily on communities. Under the global health concept, these problems are secondary, with organization interventions being oriented more on global issues, i.e., related to both developed and developing countries, even though this means no longer dealing with the national health priorities of developing countries.

Animal health agendas also sometimes differ: the priority given by FAO and OIE to foot and mouth disease (FAO and OIE, 2012) addresses the interests of meat exporting countries already free of the disease more than those of subsistence livestock farming countries whose production is domestic market oriented (Figuié and Fouilleux, 2013; G. R. Thomson *et al.*, 2013; Scoones *et al.*, 2010).

As noted by Gabas and Hugon (2001), these examples show that common goods differ according to societies, their level of development and integration into the global economy. Their production involves state coordination in a potential setting of conflicts of interest, power relations, hegemony and dependency.

Moreover, based on the example of the H1N1 flu situation, Nuzzo and Gronvall (2011) showed that many counties 'do not play the game' nor do they apply the recommendations of international organizations, despite being members. Some – against WHO recommendations – restrict air exchanges and place travellers in quarantine. Several have also prohibited swine imports from affected countries despite joint WHO, FAO, OIE and WTO recommendations.

This last example raises the issue of the necessary balance between global governance and sovereignty in response to global risks.

Collaborative yet sovereign states

International cooperation in the health sector is not new but has taken on a new form with the onset of emerging diseases. Minimalist treaties in the fourteenth century established the basis for such cooperation to facilitate trade and travel – the aim was to harmonize border control and quarantine measures while promoting information sharing.

WHO was founded in 1948 as an offshoot of existing organizations. One of its main tasks is to coordinate epidemiological surveillance activities through the collection and dissemination of epidemiological information provided by states (Fee *et al.*, 2008). OIE was created in 1924 under the name *Office international des épizooties*. The event that triggered its creation was a rinderpest outbreak in Europe following the transit, via the port of Antwerp, of zebu animals from Southeast Asia on their way to Brazil. The countries that founded these organizations did not want the fear of the spread of devastating diseases to impede global trade. These countries thus committed themselves to reporting, through these organizations, all relevant information on changes in the health situation within their countries.

Research on public health policies highlighted a paradigm shift that took place during the last decades of the twentieth century. King (2002), as part of a US administration project, studied the emergence and rise in popularity, in the late twentieth century, of an 'emerging disease paradigm' in the American understanding of the international health situation. In the same vein, Brown *et al.* (2006) analysed the history of WHO between 1948 and 1988 and described its role in the transition from an 'international health' paradigm to a 'global health' paradigm. Fidler (2003), based on studies on the public health impact of globalization, also described the weakening of a Westphalian system and shift to a post-Westphalian system in the 1990s, thus marking the end of the noninterventionism dogma in national public health policies.

Former paradigms discussed in these studies were modelled on sovereign states protecting their countries against the introduction of infectious diseases through border controls. This cooperation was based on a principle of non-intervention against the activity or inactivity of states against diseases (Fidler 2003). New paradigms emerged in a globalization setting and stressed the need for new:

> "[...] institutional fluidity in response to the increasing economic, political, and social interdependence of the modern world and the resulting common dangers and opportunities in the form of diseases, products, and ideas that readily cross borders" (Fee *et al.*, 2008, p. 632).

These new paradigms urge preservation of traditional border control measures implemented by sovereign states to protect their countries, while simultaneously mobilizing deterritorialized networks to contain diseases at their source (King, 2002). New paradigms replace international cooperation between independent territorialized states by, "global projects conducted by coalitions of public, private and nongovernmental organizations" (King, 2002, p. 774). Beck (2009) went further by suggesting that global risks open, "a moral and political space that can give rise to a culture of responsibility that transcends borders and conflicts".

These developments thus raise the state sovereignty issue. Recent emerging diseases (SARS, H5N1) led to the signing of an agreement between states regarding the revision of the OIE Terrestrial Animal Health Code and the WHO International Health Regulations (IHR)[46] to further strengthen the commitment of countries to collaborate, especially on animal disease surveillance, while increasing state transparency on their epidemiological status.[47] In particular, this involved dealing with the reactions of relatively uncooperative states, such as China at the onset of the SARS outbreak, whose government had refused to communicate some so-called 'state secret' information (*Le Monde*, 9 April 2003).

46. The latter defined a new disease category: public health emergencies of international concern (PHEIC), requiring coordination of an international response and for which IHR requires countries especially to enhance capacities for coordination, preparation, field surveys, risk communication and social mobilization.

47. http://www.afro.who.int/fr/centre-des-medias/communiques-de-presse/item/5136-renforcer-les-principales-capacit%C3%A9s-pour-pr%C3%A9venir-la-propagation-internationale-des-maladies.html (available in French only).

This limited state cooperation could be explained by countries' intention to protect their immediate economic interests, as discussed earlier. However, it could also reflect a determination to defend their national sovereignty by releasing their national policies from the control of international authorities, including that which extends beyond the health sector. This control can reflect a deliberate attempt by international organizations to seize the opportunity of health crises to make profound changes in the concerned countries. These changes are an attempt to set up a development ideology aimed at achieving good governance with the participation of civil society and primarily NGOs. This is what Atlani-Duault (2005) showed through an anthropological approach to AIDS control projects implemented in new Central Asian countries.

Tools currently used internationally are not very binding. The idea of drawing up an international health intervention right has been briefly discussed.[48] This right would have been based on the humanitarian intervention right advocated in the 1980s by NGOs, such as Doctors Without Borders, in the name of moral urgency. However, the idea of humanitarian or health intervention raises substantial criticism that it is associated with a new form of imperialism of powerful states over the weakest states. But this was not followed up as the respect for state sovereignty remains a major concern with regard to international relations.

Setting objectives for collective action against emerging zoonotic diseases

Emerging infectious disease control is a major collective action challenge. It requires the mobilization of a set of local and international stakeholders whose actions must be coordinated in an uncertain emergency setting.

Public authorities (national and international) support this mobilization by focusing on cognitive and cultural issues, while also striving to boost awareness on the collective interest and public goods.

This dominant view tends to depoliticize the health issue, ignore potential conflicts of interest, power games, voluntary resistance, etc., whereas we have tried to highlight them here through animal health and zoonotic disease examples.

Local stakeholders have their own specific rationales that are geared towards protecting their immediate interests (e.g., avoiding slaughter of their herds), while also avoiding the stranglehold of authorities (national, international, public, private). These authorities are often tempted to seize the opportunity of a health crisis to interfere and make various

48. In France, in 2006, a National Assembly debate was focused on the need to set up an international intervention right in response to the fact that some states, such as Turkey and China, under-declared cases of flu. This was to avoid "national rationales that could have major (international) impacts", according to a member of government involved in the Assembly debate.

changes, which may include the implementation of a policy to 'modernize' the livestock farming sector. This modernization process is inevitably accompanied by a redistribution of added value and power in these sectors, in addition to increased control over the economic stakeholders.

Mormont (2009) suggested mobilizing sociologists in a research-intervention approach to deal with collective risks. The first step of this approach is to recognize that the stakeholders are organized and then to conduct a joint assessment of the situation with the concerned stakeholders: "This assessment aims to highlight the different viewpoints on the situation, while specifying the differences and even tensions, for instance in the definition of the risks and liabilities.[49]"

At national and international levels, states must arbitrate between defence of their sovereignty and achieving international integration, between health and other socio-political issues. Major economic actors may also seek to protect themselves from any trade disruptions that could occur following the potential implementation of health measures. Moreover, beyond their concern for efficiency, international organizations are also driven by their own sometimes competing rationales (see Chapter 2).

EIDs have provided health stakeholders with an opportunity to advance the idea – sparked in the 1980s – that infectious disease management is a global public good. With the advent of the emerging disease issue, management (initially focused on human diseases) has been broadened to encompass animal diseases with zoonotic potential, while strengthening the role of epidemiological surveillance in management schemes.

International organizations (FAO, OIE, WHO) are now focused mainly on endemic diseases. They have, however, also gauged the scale of the challenges raised by emerging diseases, their catastrophic potential and the need for wide-ranging mobilization for emergency action, despite the uncertainties that prevail. They underpin this global public good framework. In association with the scientific community and the media, they have succeeded in achieving changes by configuring cause, consequence and intervention at different geographical and political representation scales (according to the scale politics concept; King, 2004).

The global public good concept can be used to achieve cognitive change to nurture collective mobilization on health issues. There are still, however, several hurdles to overcome with regard to its application in the collective action field.

The public good framework is currently focused more on the means, and especially on surveillance of diseases (or even events) that could become international public health

49. In collaboration with all stakeholders, new forms of coordination that could help change the situation are then sought, such as changes in relationships between protagonists, development of an action-research programme upon which all stakeholders could agree. "This involves collective (although not necessarily joint) capacity building on problem management. In this process, the sociologist – instead of simply outlining the stakeholders' motives and goals from a deterministic perspective – investigates potential redefinitions of their practices, skills and relations and the necessary conditions" (Mormont, 2009, p. 12).

risks[50], than on health per se. This framing has the advantage of orienting actions towards specific concrete objectives rather than meeting general moral principles (e.g., health rights) by focusing on the structural and logistical problems that hamper effective disease prevention and control.

However, considering the means of health surveillance and control – hence intermediate goods – as global public goods, rather than health per se overlooks the debate on final goods and shared interest (serving whom and what?). The global public good concept reflects a willingness to focus on global diseases to the detriment of diseases more specific to certain socioeconomic categories, such as so-called 'neglected diseases', i.e., endemic diseases specifically affecting poor people in developing countries. The reconciliation of human and animal health issues should not conceal the economic issues pertaining to international livestock market chains. There is also a major challenge to ensure that international collective action does not become disconnected from local settings but instead finds legitimacy in local collective action.

Health itself rather than the means for its management should be classified as a global public good in order to put health forward as a universal right, while reconnecting health policies with humanitarian and social policies. By defining infectious disease control as a global public good, there is a risk that the collective action coordination principle will become too focused on defending an assumed shared interest (here we have discussed the shortcomings of this assumption) rather than promoting an ideal of solidarity so as to make health a universal right.

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50. In line with the WHO Public Health Emergency of International Concern (PHEIC) concept.